Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

FCC 95-256

In the Matter of

Preparation for International Telecommunication Union World Radiocommunication Conferences	)))	IC Docket No. 94-31

REPORT

Adopted: June 15, 1995 Released: June 15, 1995

By the Commission: Commissioner Chong issuing separate statement.

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I. INTRODUCTION

1. This Report provides the Commission's recommended U.S. Proposals for the 1995 World Radiocommunication Conference (WRC-95) to be convened by the International Telecommunication Union (ITU) from October 23 to November 17, 1995 in Geneva, Switzerland. We seek at WRC-95 to improve the international spectrum allocations and related measures necessary for the successful introduction of the global Mobile-Satellite Service (MSS), including low-Earth orbit (LEO) satellite networks. These actions will foster implementation of LEO and other MSS networks and their inauguration of worldwide, cost-efficient voice and data mobile communications services. These satellite networks, including LEOs licensed by the Commission, promise to spur a multi-billion dollar U.S. industry and to form an integral segment of the Global Information Infrastructure.

2. Our primary proposals for WRC-95 seek to designate spectrum for MSS feeder links, to obtain additional global spectrum allocations for MSS service links, and to reduce the technical and operational constraints on current global MSS allocations.[1] We also address the simplification of the international Radio Regulations and the other issues on the conference agenda, including space services, international satellite orbit allotment plans, high frequency broadcasting and future conference agendas.[2]

II. BACKGROUND

3. Notices of Inquiry. In this proceeding, the Commission has sought the public's comment on the technical, operational, regulatory, and procedural aspects of the topics on the WRC-95 agenda, the main focus of which is on MSS.[3] We also invited comment on ways in which the Commission can best structure its own conference preparatory processes in light of the ITU's new, two-year accelerated conference cycle, to ensure timely and effective planning for WRC-97 and beyond. Our Notice of Inquiry reviewed the results of WRC-93 and requested comments on the topics proposed for the WRC-95 agenda. Based on these comments and on the ongoing work of the IAC and other preparatory groups, we released a Second Notice of Inquiry seeking comment on draft recommended U.S. proposals for WRC-95 and on the IAC's Interim Report.[4] [5]

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[1] Our recommended U.S. Proposals, attached at Appendix 1, are based on the work of our WRC-95 Industry Advisory Committee (IAC), comments received in response to our Notices of Inquiry, and our participation in international preparatory activities for WRC-95.

[2] A copy of the WRC-95 agenda is provided at Appendix 2.

[3] See Notice of Inquiry, 9 FCC Rcd 2430 (1994); Second Notice of Inquiry, 10 FCC Rcd 4169 (1995).

[4] A list of commenters to the Second Notice is provided in Appendix 3.

[5] By Order, DA 95-421, released Mar. 6, 1995, we extended the date for filing reply comments to the Second Notice to afford the parties an opportunity to comment on the results of CPM-95. In Order, DA 95-945, released Apr. 27, 1995, we declined to grant a further extension of time requested by several Little LEO licensees and applicants. A motion for acceptance of late-filed reply comments was filed by Alcatel Network Systems, Inc. and other Fixed Service interests on May 15, 1995. We will

4. WRC-95 Industry Advisory Committee. As a further means of preparing for the conference, we established the WRC-95 Industry Advisory Committee to develop independent private sector proposals for consideration by the Commission in parallel with this proceeding.[6] The IAC is chaired by a member of the private sector and has an open membership. Its meetings feature broad participation by members of the public and include regular attendance by representatives of other federal government agencies. The of work the IAC is organized into six Informal Working Groups (IWGs): IWG-1 on regulatory coordination; IWG-2 on MSS below 1 GHz; IWG-3 on MSS above 1 GHz; IWG-4 on MSS feeder links; IWG-5 on space sciences; and IWG-6 on future conference agendas. The results of the IWGs' work were consolidated into an Interim Report, issued December 30, 1994, and the IAC Final Report, of May 4, 1995.[7] The IAC's views and recommended proposals expressed in its Final Report are incorporated throughout this Report.

5. Conference Preparatory Meeting. Preparations for WRC-95 have also been underway internationally in the Study Groups, Working Parties, and Task Groups of the ITU's Radiocommunication Sector (ITU-R). Under the ITU's new conference cycle, preparatory studies for each WRC are carried out by a Conference Preparatory Meeting (CPM), that holds two meetings before each conference.[8] CPM-94 organized and coordinated the work to be performed by the technical groups in preparation for WRC-95 and drafted the outline of the CPM Report to WRC-95. The resulting studies and recommendations were forwarded to and considered by CPM-95, which met from March 22 to April 5, 1995. This work was ultimately consolidated into the final CPM Report.[9] The CPM Report is a comprehensive technical report that is intended to represent the ITU-R's best available information on the technical, operational and regulatory/procedural issues relevant to the WRC-95 agenda.[10] Commission staff, U.S. industry, and other U.S. government agencies actively participated in the CPM and in the underlying work of the technical groups. The information and conclusions expressed in the CPM Report largely support U.S. views, positions, and goals for WRC-95.

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grant their request.

6 See Public Notice, Notice of Advisory Committee Establishment, released May 25, 1994.

7 FCC Industry Advisory Committee for the ITU 1995 World Radiocommunication Conference Final Report, May 4, 1995. A copy of the IAC Final Report has been associated with the docket file in this proceeding and is available on the INTERNET. See News Release, WRC-95 Industry Advisory Committee Issues Final Report, released May 8, 1995.

8 Resolution ITU-R2 (Geneva, 1993).

9 CPM Report on Technical, Operational and Regulatory/Procedural Matters to be Considered by the 1995 World Radiocommunication Conference (CPM Report), (Geneva, 1995).

10 Res. ITU-R2 also directed that preparatory studies for the regulatory/procedural matters associated with a WRC agenda are to be performed by a Working Party of the CPM (WPCPM). The WPCPM for WRC-95 met in Jan., 1995 and at CPM-95.

III. MOBILE SATELLITE SERVICE

6. The Commission's primary goal at WRC-95 is facilitating the introduction and future expansion of new mobile-satellite technologies, including Below 1 GHz MSS networks, commonly referred to as the Little LEOs or Non-Voice Non-Geostationary (NVNG) systems, and Above 1 GHz MSS networks which include Big LEO systems. We envision accomplishing that goal by taking three steps: 1) eliminating regulatory and technical constraints on existing but unused MSS allocations;[11] 2) obtaining spectrum for feeder links to support MSS service links;[12] and, 3) based on market projections for consumer demand for licensed MSS networks and requests of the Commission to authorize additional spectrum for new MSS networks, proposals for allocating additional MSS spectrum. In the Second Notice, we made preliminary proposals based on ongoing technical work in the international fora, discussions with the National Telecommunications and Information Administration (NTIA), comments to the first Notice in this proceeding, and the work of the Commission's IAC. Based on the comments, discussions, and further work that followed, including issuance of the IAC Final Report and the CPM Report, we recommend the following U.S. proposals on MSS matters for WRC-95.

A. MSS Below 1 GHz

7. Technical Constraints. We propose to remove existing technical constraints that will hinder the development of Below 1 GHz MSS networks. These constraints are: RR 608A, a footnote applied to the 148-149.9 MHz band that limits the power of a MSS system's mobile earth terminals when transmissions cross national boundaries; and, RR 608B, a footnote applied to the 149.9-150.05 MHz band that limits the power of a land mobile satellite service system's mobile earth terminals when transmissions cross national boundaries. In the Second Notice, we proposed to eliminate these constraints by replacing the power limits in the footnotes with a coordination threshold distance methodology to trigger the need to coordinate at national boundaries.[13]

8. MSS proponents and the IAC support removing these constraints on MSS.[14] Further, the CPM concluded that these restrictions are unnecessary. Addressing the power limit in RR 608A, the CPM considered a number of alternatives, but determined that the power limits in both RR 608A and RR 608B should be replaced by a coordination distance methodology to determine the need to

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[11] Primarily those made at WARC-92.

[12] WARC-92 did not make specific feeder link allocations to support MSS service links. Service links are the radio spectrum used to provide communications from the satellite to the consumer. Feeder links are the radio spectrum used to feed information from other networks, such as the public switched network via gateway stations, to the satellite and then on via service links to the consumer. An MSS service link allocation without appropriate feeder link allocations would be analogous to an automobile without an engine.

[13] Second Notice, 10 FCC Rcd at 4175-76. MSS operators would be required to coordinate with other administrations falling within a specified distance of its mobile earth terminal operations.

[14] See, e.g., E-Sat comments at 1; LEO-One comments at 12. See also, IAC Final Report at 109.

coordinate with potentially affected administrations.[15]

9. The power limits in RR 608A and RR 608B will cause considerable operational difficulties for new MSS systems. For example, a mobile earth terminal power output greater than the value specified in the existing footnotes may be necessary for successful operation of the mobile earth terminals within a country's borders. Due to the roaming nature and intended ubiquitous operations of the mobile earth terminals, it would be extremely difficult to ensure this limit is not exceeded immediately outside an operating country's borders. Further, the CPM notes that the ITU Radiocommunication Bureau has not established any guidance on the appropriate calculation methodology to determine the footnote power limits. The coordination distance methodology is a more practical approach for determining where mobile earth station terminal coordination is necessary. In their current formulation the existing footnotes are, in effect, unworkable. We therefore propose to modify RRs 608A and 608B by replacing the current power flux density limits with the coordination distance methodology given in Draft new ITU Recommendation ITU-R M. [Doc. 8/46]. See Appendix 1, Section A, USA/ / 7 and USA/ /8.

10. Allocation Constraints. WARC-92 adopted allocation constraints on bands available for Below 1 GHz MSS to protect existing users. In the 137-138 MHz band, the meteorological satellite (metsats), space operation and space research services have primary allocation status.[16] In certain segments of the 137-138 MHz band MSS also has a primary allocation status.[17] We noted in the Second Notice that NOAA has commitments worldwide to operate metsats in the band until at least the year 2006. In its Interim Report, the IAC recommended phasing out metsats in one segment of the band where MSS has a co-primary allocation status. We accepted that recommendation but expanded it to include phasing out metsats in the 137-138 MHz band wherever MSS has co-primary allocation status.[18] Specifically, metsats would be co-primary until the year 2006 and secondary until the year 2010. We also invited comment on the continued need for primary space operation and space research services allocations in the subject bands.[19]

11. MSS parties support a metsat phase-out. Starsys urges the Commission to work with the National Oceanic and Atmospheric Administration (NOAA) and the Department of Defense (DoD) to facilitate moving metsats to other unspecified bands.[20] ORBCOMM supports our proposal to change the allocation status of metsats to reflect a move to other bands and requests the Commission to seek a short transition period.[21] The IAC also endorses the Second Notice proposals and maintains

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[15] CPM Report at 13.

[16] Second Notice, 10 FCC Rcd at 4176.

[17] Specifically, in the 137-137.025 MHz and 137.175-137.825 MHz segments of the entire band.

[18] Second Notice, 10 FCC Rcd at 4176.

[19] Id.

[20] Starsys comments at 4-5.

[21] ORBCOMM comments at 5; see also CTA comments at 16-17.

that NVNG MSS systems can share with metsats, space operation and space research services in the 137-138 MHz band.[22]

12. NOAA previously indicated that it would have continuing operations in the 137-138 MHz band until the year 2010.[23] NOAA now states that metsat downlinks may continue indefinitely in this band and, therefore, that protection must continue to be provided.[24] NOAA also claims that existing satellites that use frequencies in the middle of the 137-138 MHz band will continue operations until 2010. Further, it maintains that system design changes resulting from a planned convergence of NOAA satellites with DoD metsats makes phase-out dates uncertain.[25]

13. In light of NOAA's comments, we propose that the metsat, space research and space operations services continue on a primary basis in the 137-138 MHz band. The Commission, in concert with below 1 GHz MSS proponents, recognizes the importance of metsat operations and the attendant necessity for protecting continuing metsat operations during a phase-out period. As plans for migrating metsats, space research and space operations out of band segments where MSS is co-primary become more concrete, it may be possible to delete unused allocations and allow MSS networks to gain unencumbered spectrum where they can develop.

14. WARC-92 allocated the 149.9-150.05 MHz band to the land mobile-satellite service on a co-primary basis with other band users. We proposed in the Second Notice that this band be allocated generally to MSS. This type of allocation would encompass all mobile satellite services -- land or otherwise.[26] NVNG MSS parties and the IAC support a general MSS spectrum allocation.[27]

15. Most entities recognize that limited spectrum and the expense of launching a satellite service dictate that economies be taken wherever possible. A satellite platform is not limited inherently in the user classes it can serve. Consequently, once launched, that platform can provide service to land, maritime and even aeronautical users. A general MSS allocation allows user demand to determine the mix of services within a given spectrum allocation. This is efficient use of a limited resource. Additionally, this type of allocation modification is in keeping with the VGE's principle of making allocations to as broad a service classification as possible and with the U.S.'s principle of proposing broad flexible allocations. Accordingly, we maintain our Second Notice proposal to allocate the 149.9-150.05 MHz band to MSS generally. See Appendix 1, Section A, USA/ /2 - USA/ /3.

16. Spectrum Requirements and Proposed Allocations. In its Interim Report, the IAC

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[22] IAC Final Report at 90-93.

[23] See Second Notice, 10 FCC Rcd at 4176.

[24] NOAA comments at 4-5.

[25] NOAA reply comments at 2-4.

[26] Second Notice, 10 FCC Rcd at 4177.

[27] See, e.g., E-SAT comments at 1-2; GE comments at 17. See also IAC Final Report at 102, 104.

indicated a need for at least an additional 7-10 MHz of spectrum for Below 1 GHz MSS by the year 2000 and an additional 13-20 MHz by the year 2010.[28] In the Second Notice, we published a table provided by the IAC of potential frequency bands for Below 1 GHz MSS allocations. However, because there was not consensus among affected parties on the future use of the bands in the table, we only proposed one band, 399.9-400.05 MHz, for a new worldwide MSS allocation.[29]

17. MSS proponents continue to express a need for an additional 10 MHz of spectrum by the year 2000. They emphasize that having spectrum available for use by that date requires immediate allocations beginning at WRC-95. The MSS parties suggest various frequency bands for potential WRC-95 allocations. In its Final Report, the IAC notes that newly allocated spectrum is typically not available for operational use until five years following allocation.[30] It further indicated that specific proposals for spectrum allocations would be submitted after further analyses.[31]

18. Existing users of bands identified in the Interim Report table express concern about the impact new MSS operations would cause on their services. The Amateur Radio Relay League (ARRL), Association of American Railroads (AAR), APCO, Motorola, and Utilities Telecommunications Council (UTC) generally maintain that below 500 MHz frequency bands identified in the IAC's table are now heavily used and cannot support NVNG MSS operations.[32] Further, AAR contends that NVNG MSS proponents do not adequately address second generation NVNG MSS systems that would offer a broader range of services and would require longer transmission periods. This could worsen the interference potential in shared bands.[33]

19. In the current radiofrequency spectrum environment in which there are burgeoning services and uses but little fallow useable spectrum, accommodating new technologies and services will almost always affect incumbent spectrum users. Although this is usually unavoidable, it is not an insurmountable obstacle to pursuing new allocations and introducing new services. Since the release of the IAC Final Report, NVNG MSS proponents have continued their analyses of potential frequency bands and have reported to us a total of 10 MHz of spectrum that they recommend for immediate proposal to WRC-95: 216.5-217 MHz and 217.5-218 MHz (space-to-Earth), 386-390 MHz (space-to-Earth), 399.9-400.05 MHz (Earth-to-space), 420-422 MHz (Earth-to-space), 450-451 MHz (Earth-

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[28] IAC Interim Report at 65.

[29] The 399.9-400.05 MHz was allocated in January 1993 for MSS in the U.S.and is available for that use as of 1 January 1997. Our Second Notice proposal would extend that use worldwide. 10 FCC Rcd at 4248. That proposal was non-controversial. We are maintaining that proposal in this document. It appears as Appendix 1, Section A, USA/ /9.

[30] IAC Final Report at 84. The Final Report also includes estimates for future MSS Below 1 GHz spectrum requirements.

[31] Id. at 108.

[32] See, e.g., ARRL reply comments at 2; AAR reply comments at 8; Motorola reply comments at 19-24; UTC comments at 3-7.

[33] AAR reply comments at 9.

to-space), 455-456 MHz (Earth-to-space) and 459-460 MHz (Earth-to-space).[34] Of these bands, and other subsequently recommended bands, we propose today that the following frequencies be allocated internationally to MSS:[35]

Table 1.

Bands Proposed for Worldwide MSS Below 1 GHz

Frequency Band	Bandwidth	Proposed Use	Direction
216-216.5 MHz	0.5 MHz	Non-GSO gateway earth station operations, Service links	space-to-Earth
217.5-218 MHz	0.5 MHz	Non-GSO gateway earth station operations, Service links	space-to-Earth
399.9-400.05 MHz	0.105 MHz	Service links	Earth-to-space
401-404 MHz	3 MHz	Service links	space-to-Earth
455-456 MHz	1 MHz	Service links	Earth-to-space
459-460 MHz	1 MHz	Service links	Earth-to-space

20. The bands 216-218 MHz and 219-220 MHz, which encompass the system proponents' suggested downlink bands at 216-216.5 MHz and 217.5-218 MHz, are currently allocated to the Maritime Mobile service on a primary basis. Use of these bands by government and commercial interests appears relatively sparse,[36] and the MSS system proponents state that careful siting of their few gateway earth stations, as well as imposition of appropriate power flux density limits, can eliminate problems of unacceptable interference from and into MSS operations. Some commenters note that use of the 216-216.5 MHz band is under consideration in a pending rulemaking proceeding

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[34] Supplemental Reply Comments (Joint Comments) of CTA Commercial Systems, Inc., E-Sat, Inc., Final Analysis Communication Services, Inc., GE American Communications, Inc., Leo One USA Corporation, Orbital Communications Corporation, Starsys Global Positioning, Inc. and Volunteers in Technical Assistance, May 18, 1995.

[35] See Appendix 1, Section A, USA/ /7 - USA/ /17.

[36] Joint Comments at 15.

for auditory and health care assistance devices and other low power services.[37] They suggest that MSS not be authorized until after such time as the domestic uses of this band are finally determined and adequate protections are established. We are confident, however, that MSS power flux density limits can be devised to protect low-power, localized devices, such as those described by the commenters. If such protection is necessary, appropriate restrictions will be imposed in the course of the domestic allocation process which would be required to implement any international allocation, and therefore need not finally be resolved at this time. This domestic proceeding would ensure that MSS systems could share in these bands without causing harmful interference to other domestically allocated services. Accordingly, we will go forward at this time to propose the allocation of the 216-216.5 MHz band to MSS.

21. Waterway Communications Systems, Inc. and Paging Systems, Inc., entities which offer service to the maritime community over the Automated Maritime Telecommunications System (AMTS) in the 217.5-218 MHz band, allege that the AMTS is heavily used and that MSS operations will harmfully interfere with that service. Again, we conclude that downlink power flux density limits can be devised to protect the AMTS from harmful interference. Because feeder link flux density limits can be more restrictive than those for service links due to the use of high gain antennas at the feeder link earth stations, it may be necessary to restrict the use of both of these bands in the United States to MSS feeder link operations. Such concerns can be fully addressed in the domestic allocation process.

22. In addition to the concerns of in-band users, a number of out-of-band issues exist. For example, a Navy SPASUR radar operates on the frequency 216.98 MHz (± 1 kHz) and MSS feeder downlinks may provide out-of-band emissions to this band and may have a potential to cause unacceptable interference to the other users in adjacent bands from out-of-band emissions. However, system proponents are of the view that sharing between the SPASUR system and MSS gateway earth station links can be successfully accomplished.[38] MSS operations in these bands would also be adjacent to television Channel 13 (210-216 MHz), but the NVNG MSS proponents state that earth stations can be located a sufficient distance from television stations to minimize interference. We concur with this preliminary analysis and propose allocation of these frequencies for MSS.

23. The 387-390 MHz band, which is allocated for government use, is allocated to MSS on a secondary basis in all three Regions. It is thus particularly desirable for use by inherently global satellite systems, such as those proposed by LEO MSS proponents. MSS system proponents believe that this band is technically suitable for a shared allocation for a number of reasons. The existing users, however, disagree, and have proposed that the 401-404 MHz band be considered for a downlink allocation instead. Based on our understanding of the use of these frequencies, we concur

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[37] Notice of Proposed Rule Making in WT Docket 95-56, Amendment of the Commission's Rules Concerning Low Power Radio and Automated Maritime Telecommunications System Operations in the 216-217 MHz Band, FCC 95-174, released May 16, 1995. See Phonic Ear, Inc. comments; ProNet, Inc. comments.

[38] Joint Comments at Appendix B.

that the 401-404 MHz band appears suitable for allocation to MSS service downlinks.[39] See Appendix 1, Section A, USA/ /10 - USA/ /14.

24. As stated in the Second Notice, we also propose the allocation of the 399.9-400.05 MHz frequency band to MSS in the Earth-to-space direction. While commenters note that they would like the flexibility to use this band in either the Earth-to-space or space-to-Earth direction, they have submitted no analyses supporting the ability of MSS systems to use this band in both directions. Because we do not have a clear indication of which direction is preferred by system proponents, we will submit our original proposal that this MSS allocation be specified for use in the Earth-to-space direction.

25. MSS system proponents suggest a gateway earth station uplink in the 450-451 MHz band, which is currently allocated for broadcast auxiliary use.[40] Again, the proponents assert that the usage of this band is low, based on their analysis of authorized transmitters in the band, as well as results of frequency monitoring performed by the parties. System proponents allege that by employing a combination of dynamic channel avoidance, low duty cycles, brief message duration and geographical separation, sharing with broadcast auxiliary services can be accomplished successfully. The most significant source of potential interference to MSS operations in this band is the proposed allocation of the adjacent 448-450 MHz band to use by wind profiler radars. For reasons discussed at greater detail in their Joint Comments, the system proponents believe that geographic separation and service avoidance can successfully be employed to overcome such potential interference into and from wind profiler radars.[41] Upon examination of the analysis presented, however, we are not convinced that sharing is possible. The use of adjacent bands by a significantly large population of extremely high powered radars is likely to cause unacceptable interference into the MSS satellite receivers. Absent a more compelling showing that sharing is possible, we will not propose this band for allocation.

26. Finally, the system proponents suggest that the 455-456 MHz and 459-460 MHz bands be proposed for MSS service uplinks at WRC-95. The 455-456 MHz band is presently used by the broadcast auxiliary service for remote pickup. The 459-460 MHz band is assigned to the Domestic Public Land Mobile Radio Service (DPLMRS). System proponents point out that ITU Task Group 8/3 concluded that MSS uplinks can successfully share with terrestrial mobile services by using dynamic channel assignment or low power Code Division Multiple Access (CDMA) spread

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[39] System proponents requested 4 MHz of downlink spectrum at 386-390 MHz. Because we are not proposing the allocation of the 387-390 MHz band, we will not propose allocation of the 386-387 MHz band either. System proponents have also suggested that the band 420-422 MHz, another government band, may be suitable for allocation as an MSS service uplink. It is our understanding that high-powered airborne and surface radars operating in nearby bands will make sharing extremely difficult. Further, ARRL notes that this band is used by amateur radio operators for ATV operation and fixed repeater links, which may be incompatible with MSS operations. Without further study of the existing use of 420-422 MHz band, we will not propose at this time that the band be allocated to MSS.

[40] 449.75-450.25 MHz may also be used for the space operation service and space research service in the Earth-to-space direction.

[41] Joint Comments at 14.

spectrum systems. The American Petroleum Institute (API), supported by comments submitted jointly on behalf of a number of private land mobile radio user organizations, suggests that MSS operations will be incompatible with API's use of a 25 kHz uplink channel at 459 MHz. This channel is primarily used for communications directly related to oil spill and containment operations, and is secondarily available for general base-mobile operations on a non-interference basis. The channel is lightly used, API maintains, so that it will be clear when required for communications related to containment operations. This channel is already available for shared use, if the alternative use is transparent. We believe that the technical analyses presented by the system proponents corroborate that channel assignment and low power techniques, in conjunction with brief message duration and geographical separation similar to those adopted by the Commission in § 2.106, Table of Allocations, for other frequency bands, can be used successfully to assure that oil spill containment operations are not adversely affected.[42] These techniques will also, we believe, protect broadcast auxiliary uses. We therefore propose to allocate the 455-456 MHz and 459-460 MHz bands in the Earth-to-space direction.

B. MSS Above 1 GHz

27. Technical Constraints. Technical constraints that could hinder implementing MSS have been identified in this proceeding and in the ITU-R process. In the Second Notice we proposed to remove several of these constraints. Specifically we proposed to clarify whether MSS power density limits specified in RR 731E[43] that apply to the 1610-1626.5 MHz band are referenced to a "peak" or to a "mean" value. We also proposed to relax the MSS power density limits referenced in RR 753F[44] that are used to trigger coordination. We also asked whether RR 733E, applied to the 1613.8-1626.5 MHz band to protect radio astronomy operations in the adjacent 1610.6-1613.8 MHz band, should be suppressed or modified.[45]

28. Concerning RR 731E, we proposed to reference the power density limits in RR 731E as a "mean" rather than a peak value. We also proposed that language in RR 731E providing protection to the aeronautical radionavigation service (ARNS) to stations operating in accordance with RR 732, and to fixed service stations operating in accordance with RR 730 be deleted and replaced with a reference to RR No. 953.[46] We noted that many contend that this language places MSS networks in a de facto secondary status relative to other services. We noted that RR No. 953, in conjunction with the coordination requirements of Resolution 46, provides sufficient protection to the

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[42] Id. at 12 & Appendix A.

[43] Second Notice, 10 FCC Rcd at 4177-78.

[44] Id. at 4180-81.

[45] Id. at 4178-80. We have adopted rules domestically to protect Radio Astronomy operations in this band. See In the Matter of Amendment of the Commission's Rules to Establish Rules and Policies Pertaining to a Mobile Satellite Service in the 1610-1626.5/2483.5-2500 MHz Frequency Band, 9 FCC Rcd 5936 (1994)(hereinafter "Big LEO Report").

[46] RR No. 953 of Article 9 of the international Radio Regulations cautions administrations to be cognizant of radionavigation and safety services when making frequency assignments.

aeronautical radionavigation services from MSS services operating on a co-primary basis in the 1610-1626.5 MHz band.[47]

29. Generally, MSS parties support clarifying the RR 731E power density limits and removing the language that provides specific protection to non-MSS services. However, they disagree on whether those power density limits should be referenced as a "peak" or as a "mean" value. The CPM recognized the ambiguity of the values given in RR 731E and decided that the power density limit that applies where stations are operating in accordance with RR 732 should be a "peak" value[48] and that the limit that applies elsewhere should be a mean value.[49] The IAC, many of whose members participated in the CPM, recommends this approach. It also recommends deleting the language giving specific protection to ARNS.[50]

30. We propose to modify RR 731E by specifying a "peak" power density limit in parts of the band used by systems operating in accordance with RR No. 732, and a "mean" power density limit in other parts. We also propose to delete the language specifying additional protection of non-MSS services in the band. Protection under RR No. 953 should be sufficient. The CPM Report supports this action, and the record in this proceeding reveals no opposition to our proposals.[51] See Appendix 1, Section B, USA/ /14.

31. RR 753F references power flux density limits contained in RR No. 2566 as a trigger for initiating coordination between space stations of the mobile-satellite and terrestrial services. We have expressed concern that this limit may be too stringent and could result in unnecessary coordinations.[52] We proposed in the Second Notice to modify RR 753F by replacing the reference to RR No. 2566 with increased limits specific to RR 753F.[53]

32. TRW and LQP and others support our proposal.[54] The CPM considered the RR 753F limits and agreed that the current limits may be more stringent than necessary for initiating

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47 Second Notice, 10 FCC Rcd at 4178 With respect to other non-MSS services operating in the band, Res. 46 provides a mechanism to resolve potential interference conflicts.

48 This would provide a measure of control over the maximum MSS power level an ARNS station would "see."

49 CPM Report at 17.

50 IAC Report at 156-57.

51 Parties indicate they can support the CPM proposal, even those whose initial comments differed. See, e.g., LQP reply comments.

52 Second Notice, 10 FCC Rcd at 4180.

53 Id. at 4180-81.

54 TRW comments at 8; LQP comments at 10-11.

coordinations to protect terrestrial services.[55] The National Academy of Sciences (NAS) contends the new limits could result in out-of-band interference to radio astronomy in the 4900-5000 MHz band. Therefore, it maintains that cautionary language urging MSS operators to take all practicable steps to protect radio astronomy should be added.[56]

33. We will adopt as proposed the less stringent limits recommended by the CPM.[57] This should reduce unnecessary coordinations. We will also propose cautionary language that provides protection to radio astronomy in the 4900-5000 MHz band.[58] Our modified proposal appears in Appendix 1, Section B, USA/ /34.

34. In the Second Notice, we declined to propose to suppress or modify RR 733E as requested by some parties. We did, however, suggest that rules to protect Radio Astronomy, similar to the ones we adopted in the Big LEO Report, could be proposed as an international standard.[59]

35. MSS parties did not support our suggestion that the Big LEO radio astronomy rules be proposed internationally, noting that the criteria developed in the Big LEO Report should be considered unique to our domestic situation. Instead, they argue that RR 733E is redundant when both services are co-primary and, therefore, it should be suppressed. NAS argued strongly against suppressing the note. NAS maintains that under the broad protection of RR 733E interference determination and negotiations can be done on a case-by-case basis.

36. It may not be appropriate in this case to propose internationally protection criteria that were developed purely to address the domestic environment. However, radio astronomy operations in the 1610.6-1613.8 MHz band should be afforded some degree of protection. RR 733E provides recognition of the special needs of radio astronomy and remains the appropriate mechanism for ensuring that service is protected. Furthermore, it is not redundant as applied to out-of-band emissions from MSS and RDSS stations operating in bands adjacent to the 1610-1610.6 MHz and 1613.8-1626.5 MHz bands. Therefore, we decline to suppress RR 733E.[60]

37. Allocation Constraints. The 1525-1559 MHz and 1626.5-1660.5 MHz bands are currently structured such that various portions of the bands are allocated to specific types of MSS

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[55] CPM Report at 17-19.

[56] NAS comments at 12.

[57] As LQP correctly observes, these limits are intended to be applied on a "per station" basis. See Recommendation ITU-R IS.[Document 2/6], "Sharing in the 1-3 GHz frequency range between the non-geostationary space stations operating in the mobile-satellite service and the fixed service" at Table 1 and Annex 1, § 1.1.

[58] The concerns NAS raises have already been addressed domestically in the Big LEO Report.

[59] Second Notice, 10 FCC Rcd at 4179-80.

[60] We note, too, that Motorola and Iridium have retracted their earlier positions that RR 733E be suppressed. See Letter from Motorola and Iridium, May 19, 1995.

operations.[61] This is not in harmony with the goal recognized in the VGE Report of making broad flexible spectrum allocations. We proposed in the Second Notice to revise the entire structure of the bands to a general MSS allocation.

38. All MSS parties support our proposal.[62] The IAC also recommends proposing generic allocations in these bands.[63] We propose that these bands be allocated for MSS. These proposals are similar to U.S. proposals to WARC-92 for MSS in these bands, and are consistent with allocation principles of the U.S. in past conferences and of the VGE's latest recommendations. There are also consequential changes to footnotes associated with the bands. These proposals appear in Appendix 1, Section B, USA/ /1 - USA/ /22.

39. Spectrum Requirements and Proposed Allocations. The ITU-R developed estimates of future MSS spectrum requirements that call for up to an additional 103 MHz (in each transmission direction) by the year 2005. To begin to address this future spectrum shortfall we proposed in the Second Notice to make the 1675-1710 MHz available for MSS on a co-primary basis worldwide.[64] We also proposed to adjust 2 GHz MSS allocations made at WARC-92 in order to take account of the recent 2 GHz PCS allocation that affected the availability of WARC-92 MSS spectrum in the United States.[65] Specifically, we proposed to make the 1985-2025 MHz and 2165-2200 MHz bands available for MSS on a worldwide primary basis. These proposals would allow for possible expansion of licensed systems or accommodation of new global satellite networks. Additionally, the Commission has been requested to pursue worldwide allocations around 20 GHz and 28 GHz for NGSO FSS/MSS networks.[66]

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61 *I.e.*, aeronautical-mobile, maritime-mobile, land-mobile, *etc.* See Second Notice, 10 FCC Rcd at 159-67.

62 AMSC also supports application of RR 726C, which requires priority access and immediate availability of channels for safety communications, to the 1525-1530 MHz band. Whether to include a footnote imposing such a requirement domestically in the U.S. table of allocations is the subject of another proceeding. See First Report and Order/Further Notice, 8 FCC Rcd 4246 (1993). To preserve flexibility in this allocation, we are not proposing an international footnote. However, this action is in no way intended to foreclose a U.S. action imposing this requirement on domestic licensees.

63 IAC Final Report at 159-64.

64 WARC-92 made a co-primary allocation for Region 2 only. The meteorological-satellite and meteorological aids services also have co-primary allocations within the band. Our proposal was contingent upon the satisfactory completion of sharing studies and sharing criteria for the use of this band.

65 See Memorandum Opinion and Order, 9 FCC Rcd 5947 (1994).

66 Teledesic comments at 4-12.

40. Many MSS parties support our proposal for the 1675-1710 MHz band.[67] The CPM addressed sharing among MSS and the meteorological-satellite and meteorological aids services for which the band is also allocated. It concluded that sharing with the meteorological-satellite service is possible under certain conditions,[68] and that sharing with the meteorological aids service requires further study.[69] The IAC recommends that consideration be given to extending the current Region 2 MSS allocation in the 1675-1710 MHz band to all three Regions.[70] It includes this band in its recommended proposals. Several government agencies, and in particular the National Oceanic and Atmospheric Administration, oppose proposing any changes in the current allocation until studies examining the effect of MSS operations in the band are completed.

41. We will not propose any changes in the 1675-1710 MHz allocation at this time. Although substantial work has been completed regarding sharing between meteorological-satellite and MSS,[71] additional studies will be required to address sharing with meteorological aids.[72] A reasonable amount of time should be allowed for completion of those studies in order to ensure that any proposal advanced will not include unduly burdensome allocation constraints.[73]

42. We will, however, continue to advance the 2 GHz MSS allocation adjustment proposals of the Second Notice with a single slight modification. We originally proposed a 5 MHz overlap, from 1985-1990 MHz, of the spectrum allocated for PCS in the U.S. spectrum, and a corresponding 5 MHz segment at 2160-2165 MHz.[74] We noted that this spectrum may be usable outside the U.S. and, therefore, useful in future satellite coordinations. However, since the 1985-1990 MHz segment may not be usable for co-primary MSS in the U.S., we are eliminating both 5 MHz co-primary MSS segments from our proposal.

43. Most parties support this proposal but note that transition plans need be developed for

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67 AMSC comments at 11; Iridium at 17-18. CMC states that as there is no companion band in the downlink direction, it is unlikely this allocation can be made. It suggests allocating a portion of the 1492-1525 MHz band as a companion downlink band.

68 See CPM Report at 30.

69 See id. at 29.

70 IAC Final Report at 152.

71 See Draft New Recommendation ITU-R SA.[Document 7/14].

72 Completion of such studies has been designated an urgent matter for the ITU-R. See ITU RES213 (WARC-92).

73 We also note that the 1492-1525 MHz uplink band with which this band is paired has significant allocation constraints that may not be easily addressed through sharing criteria. See CPM Report at 28.

74 Second Notice, 10 FCC Rcd at 4201-04.

affected services.[75] That is, there should be a mechanism in place to transition existing users out of spectrum that is re-allocated to MSS. These types of issues are being considered in a proceeding to allocate 2 GHz spectrum for MSS domestically. It is inappropriate to advance domestic transition requirements in international proposals,[76] particularly since other administrations may require, or may choose, different transition plans. We recommend a U.S. proposal to add a worldwide primary MSS allocation from 2010-2025 MHz and to add for Regions 1 and 3 a primary allocation from 2165-2170 MHz. As a result there would be 35 MHz of spectrum worldwide in each direction of transmission, that is 1990-2025 MHz (uplink) and 2165-2200 MHz (downlink).[77] The 2 GHz MSS allocation proposals appear in Appendix 1, Section B, USA/ /29, USA/ /33.

44. At WARC-92, different dates of entry into force of 2 GHz allocations were agreed upon. RR 746C provides an entry date of 1 January 1996 for the United States and several other administrations. RR 746B specifies an entry date of 1 January 2005 for all other administrations. There is interest on the part of other administrations and entities, both U.S. and non-U.S. on aligning these dates to one around the year 2000.[78] Conversely, at the CPM some administrations with extensive fixed service use in 2 GHz bands expressed an interest in pushing the RR 746B date to a later one.

45. We stated in the Second Notice that consideration of these dates should be in the context of overall consideration of 2 GHz MSS spectrum allocations.[79] We intend to maintain RR 746C that provides a 1 January 1996 entry date for the United States. We believe that a change in the RR 746B date is a matter for negotiation at the conference when the 2 GHz allocations of our proposals are considered.

C. MSS Feeder Links

46. Spectrum Requirements. The United States has licensed three Big LEO MSS systems

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[75] See, e.g., CMC comments at 8-10.

[76] See Notice of Proposed Rulemaking, 10 FCC Rcd 3230 (1995).

[77] We are also proposing to downgrade to secondary the status of MSS in the 1970-1990 MHz and 2165-2170 MHz bands in Region 2, and to drop the MSS allocations for Regions 1 and 3 in the 1980-1990 MHz band. We are retaining the secondary Region 2 allocations for possible hybrid PCS-MSS operations.

[78] For instance, in INMARSAT has expressed an interest in aligning the dates. Comsat Mobile Systems would like to advance the RR 746B date to make 2 GHz spectrum outside the U.S. available earlier (Comsat Mobile Systems comments at 6-8). Motorola believes the RR 746B date should remain at 2005 to protect terrestrial fixed services.

[79] Second Notice, 10 FCC Rcd at 4204-05.

and may license two more.[80] In addition to present and future U.S.-licensed MSS systems that require feeder links, on the horizon are non-U.S. systems that will also require access to feeder link spectrum. Spectrum is currently available for the satellite to consumer transmission paths, but is not readily available for feeder links that connect the satellite system to other communications platforms.[81] Administrations who participated in the ITU-R preparation process recognized this and estimated that 200-500 MHz of spectrum would be required in each of three frequency ranges. This realization carried through to the CPM Report where participants confirmed that 200-400 MHz would be required in the 4-8 GHz and 8-16 GHz range, and 200-500 MHz would be required in the 16-30 GHz range.[82]

47. Spectrum Allocations. Obtaining spectrum for NGSO MSS feeder links is critical for initiating Big LEO services. Identifying candidate bands for feeder links has been one of the most contentious areas in the Commission's preparations for WRC-95. In the Second Notice we presented a range of candidate bands for feeder links. These bands are all distillations of a table of candidate feeder link frequency bands that had been recommended at ITU-R technical meetings and that finally appeared as candidate bands recommended for consideration by the CPM.[83]

48. None of our Second Notice candidate bands escaped comment. MSS parties make specific comments on bands and the band pairings we proposed. Essentially, those parties suggest specific modifications that would make our preliminary proposals more suitable for their specific systems.[84] GSO FSS interests also are concerned that introducing feeder links in certain FSS bands

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[80] See Loral/Qualcomm Partnership, L.P., 10 FCC Rcd 2333 (Int'l. Bur. 1995); Motorola Satellite Communications, Inc., 10 FCC Rcd 2268 (Int'l. Bur. 1995); TRW Inc., 10 FCC Rcd 2263 (Int'l. Bur. 1995). The Commission also found that Constellation and MCHI needed additional time to establish they were financially qualified, and deferred further consideration of their applications until January 31, 1996. Constellation Communications, Inc., 10 FCC Rcd 2258 (Int'l. Bur. 1995); Mobile Communications Holdings, Inc., 10 FCC Rcd 2274 (Int'l. Bur. 1995). AMSC elected to defer its financial showing. Each of the five orders is the subject of a petition for reconsideration or application for review.

[81] A service link is the transmission path between a space station of an MSS network and a user mobile earth station. A feeder link is the transmission path between a space station and a master control earth station, or gateway earth station. The gateway earth station processes the service link information transmitted through the feeder link, it interconnects the service link to other radiocommunication networks (space and/or terrestrial) or to other user mobile earth stations of the network by routing the service link information back to a space station through a feeder link. WARC-92 made several MSS frequency allocations for service links. However, that conference did not make allocations for feeder links which will operate in FSS frequency bands.

[82] In the Second Notice we stated that they estimates would likely just satisfy requirements for 1.6/ 2.4 GHz NGSO MSS systems. Additional systems would increase spectrum requirements. 10 FCC Rcd at 4192, n.77.

[83] CPM Report at 66-67.

[84] See, e.g., LQP comments at 16-18; CMC comments at 12.

could limit future expansion of GSO FSS use.[85] AMSC, opposes use of bands it intends to use for its system's feeder links.[86] Teledesic argues that any U.S. proposal must include its spectrum requirements for its NGSO FSS/MSS system.[87]

49. Table 2, below, lists the bands we recommend as U.S. proposals to WRC-95. Discussion on significant issues associated with particular bands follow the Table. Detailed proposals on these bands appear in Appendix 1, Section C.

Table 2.

Bands Proposed for Worldwide NGSO MSS Feeder Link Allocations

Frequency Band*	Bandwidth (MHz)	Transmission Direction(s)	Potential Band Pairings
5090-5250 MHz	160	Earth-to-space	6650-7075 MHz
6650-7075 MHz	425	space-to-Earth	5090-5250 MHz 15.45-15.65 GHz
10.7-10.95 GHz	250	Earth-to-space	12.75-13.25 GHz
11.2-11.45 GHz	250	Earth-to-space	12.75-13.25 GHz
12.75-13.25 GHz	500	space-to-Earth	10.7-10.95 GHz 11.2-11.45 GHz
15.45-15.65 GHz	200 200**	space-to-Earth Earth-to-space	19.4-19.7 GHz 6650-7075 MHz
19.4-19.7 GHz 19.3-19.7 GHz	300** 400	Earth-to-space space-to-Earth	15.45-15.65 GHz 29.1-29.5 GHz
29.1-29.5 GHz	400	Earth-to-space	19.3-19.7 GHz

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85 See, e.g., Hughes comments at 5-6 and 15; GE comments at 3-4.

86 AMSC comments at 12. AMSC uses the U.S. allotments in the FSS allotment Plan at Ku-band for its first geostationary satellite.

87 Teledesic comments at 3-4. Teledesic proposes both FSS and MSS operations in the 28 GHz range. It also has a feeder link requirement in this range (for which the bands it intends to use are allocated). However, Teledesic's system will use NGSO satellites. Previous considerations for FSS around 28 GHz have centered on GSO FSS systems. The FCC does, however, have an ongoing proceeding that will determine domestic use of 28 GHz spectrum between GSO FSS, the local multi-point distribution service and NGSO FSS networks. See Second Notice of Proposed Rule Making, 9 FCC Rcd 1394 (1994). Accommodation of NGSO FSS networks worldwide discussed later.

* The proposed frequency bands include, in some cases, the entire candidate frequency band identified by the CPM-95, and in other cases, a subsection of the candidate frequency band.

** Reverse Band Working would be used to accommodate two non-geostationary mobile-satellite systems in the same band or some portion of the band.

50. Several of our proposed bands warrant additional discussion. Specifically, there are domestic concerns with respect to existing aeronautical use of the 5 GHz band, fixed service use of the 6, 11 and 18 GHz frequency ranges, cable antenna relay service (CARS) use of 13 GHz, and future use among NGSO MSS feeder links, new NGSO FSS/MSS systems, geostationary FSS systems and, domestically, the local multipoint distribution service (LMDS) at 28 GHz. Existing users of these bands proposed for sharing with NGSO feeder links are concerned as to potential impact on their operations.

51. In the Second Notice, we pointed out that the Microwave Landing System currently has precedence in the 5000-5250 MHz band. We also noted that ITU-R studies indicate that sharing between services in the band may be possible with appropriate interference mitigation techniques and/or geographical separation.[88] The CPM notes that up to 130 MHz of contiguous spectrum could be made available without overlapping spectrum now used by MLS.[89] The FAA and the International Civil Aviation Organization have raised concerns about NGSO MSS feeder links possibly interfering with aeronautical uses. We recognize those concerns. However, they are not insurmountable and should not preclude feeder link use of 5 GHz spectrum. Our proposal to place feeder links in this spectrum offers a method to accommodate both services.

52. Fixed service parties are concerned about the effect new feeder link operations would have on their current operations and on the ability to accommodate fixed service growth in bands in the 6 GHz, 11 GHz and 18 GHz ranges.[90] For example, spectrum in the 6 GHz and 11 GHz ranges has been identified for relocation of 2 GHz point-to-point microwave operations that are clearing

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[88] Second Notice, 10 FCC Rcd at 4179, n.5.

[89] See CPM Report at 63-64.

[90] See, e.g., AT&T comments at 2-3; Alcatel reply comments at 2; API reply comments at 5-6. Additionally, the preceding parties, along with APCO, the Association of American Railroads, Harris Corporation - Farinon Division, the Telecommunications Industry Association (TIA) and the Utilities Communication Council, filed a "Statement of Non-Concurrence" (Statement) in response to the IAC's endorsement of certain candidate bands. See Statement of Non-Concurrence, May 16, 1995. In the Statement, FS interests express their concern that NGSO MSS feeder link use would have on current and future FS operations. They also indicate a willingness to work with NGSO MSS interests in this matter and to provide potential solutions for FS-NGSO MSS feeder link sharing. See Late Further Comments on Second Notice of Inquiry (Late Further Comments), May 15, 1995.

spectrum to make room for PCS.[91] Further, TIA notes that the 6 MHz band is already becoming saturated and that requirements for fixed service bands above 10 GHz are escalating as new technologies that require fixed service operation support come into being. TIA asks that the Commission not overlook other users in its 'drive' to accommodate MSS.[92]

53. We are taking into account current and future operations of existing use of bands that we propose to designate for NGSO MSS feeder link use. Specifically, should the 6 GHz and 11 GHz bands previously identified for the reaccommodation of displaced 2 GHz microwave licensees be designated internationally for NGSO MSS feeder link use, we intend to ensure that the current and expected relocation negotiations between 2 GHz PCS licensees and incumbent 2 GHz microwave licensees are not disrupted. To this end, we plan to give priority in the 6 GHz and 11 GHz bands to relocated 2 GHz microwave licensees during a reasonable period of time. This will allow for conclusion of relocation negotiations for 2 GHz microwave licensees and commencement of their new operations. This time period and other issues would be determined in future domestic rule making proceedings.

54. In addition, we note that the ITU-R study groups and the CPM provide extensive study and discussion of technical factors and limits that would facilitate NGSO MSS feeder links sharing with the fixed services.[93] This work can form a basis for any additional studies needed to address specific fixed service concerns in specific frequency bands. However, this should not be a hinderance to making spectrum available internationally for feeder links at WRC-95.

55. Similar concerns arise in relation to future NGSO MSS feeder link (space-to-Earth) operation in the 12.75-13.25 GHz band that is used extensively for cable antenna relay service (CARS). If that band is designated for NGSO MSS feeder link use in the United States, we would need to address domestically issues such as specific coordination procedures and protection criteria for shared use of the band. These domestic measures would be developed as part of a subsequent rule making proceeding that would be necessary before implementing any international allocation decision in the U.S. In addition, we note that all proposed allocations are subject to the fundamental principle that all existing co-primary spectrum users are protected from harmful interference that may be caused by later-in-time co-primary users.[94] For example, an existing CARS operation would be protected from harmful interference from a later-entering MSS NGSO feeder link operation.[95]

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[91] See Second Report and Order, ET Docket No. 92-9, 8 FCC Rcd 6495 (1993).

[92] TIA reply comments at 3-4.

[93] CPM Report at 22-28.

[94] See ITU Constitution, Final Acts of the Additional Plenipotentiary Conference, Art. 45 (Geneva, 1992).

[95] These protections would also apply with equal force to existing co-primary broadcast auxiliary services and CARS users operating in the 6 GHz, 13 GHz, and 19 GHz band ranges also proposed for designation for NGSO MSS feeder link use.

IV. REGULATORY/PROCEDURAL CONSTRAINTS ON NGSO SATELLITE NETWORKS

A. MSS Service Links

56. WRC-95 will review regulatory/procedural constraints on the use of frequency bands allocated to MSS between 1 and 3 GHz with a view to facilitating their use for MSS. These constraints are primarily encompassed in Resolution 46, a set of temporary procedures developed at WARC-92 to accompany the introduction of the new NGSO MSS allocations in specific frequency bands.[96] Resolution 46 provides an interim procedure for coordination and notification of frequency assignments of non-GSO networks in certain space services and other services to which the bands are allocated. The global community, including U.S. industry, has been largely satisfied with the Resolution's provisions. The commenters, the IAC, and the CPM express a uniform view that Resolution 46 should be retained with minor improvements based on the three years of experience gained in applying the procedure and on the development of technical criteria since WARC-92.[97]

57. The VGE Report recommends that the Resolution 46 procedures be combined with the coordination procedures of the existing RR Article 11 and related provisions into a single standardized coordination procedure to be provided in Article S9 (and associated Appendix S5) of the Simplified Radio Regulations.[98] The CPM concluded, however, that irrespective of WRC-95's decisions regarding Article S9 and related provisions of the simplified RRs, WRC-95 should also adopt a modified Resolution 46 containing certain recommended certain immediate improvements to the coordination of NGSO MSS networks. Modified Resolution 46 that would come into effect upon WRC-95's conclusion and would remain in effect until the entry into force of the simplified RRs.[99] The commenters support this approach.[100] We therefore propose a Modified Resolution 46 and parallel adjustments to the VGE's coordination procedures in Appendix 1, Section D, USA/ /1 - USA/ /61; Section G, USA/ /5 - USA/ /53, USA/ /97 - USA/ /111.

58. These recommended proposals would implement the improvements to the current Resolution 46 procedure recommended by the commenters and the IAC, and suggested by the CPM. These improvements, which were previously described in the Second Notice,[101] are intended to eliminate unnecessary coordinations, and include: replacing coordination distances with system specific coordination methods given in ITU-R Recommendations for coordination between mobile

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[96] Resolution No. 46 (WARC-92).

[97] See generally CPM Report at 88-108; see also IAC Final Report, at 19-22, 153-55; Iridium comments at 19-21; LEO One at 13; Motorola comments at 10-11; ORBCOMM comments at 8, STARSYS comments at 7; LQP reply comments at 18.

[98] See VGE Report, Part A, 28-29.

[99] CPM Report at 85,88.

[100] See Iridium comments at 20; LQP comments at 18; Motorola comments at 13-14; Iridium reply comments at 19-21; Motorola reply comments at 10-11; ORBCOMM reply comments at 10-11.

[101] Second Notice, 10 FCC Rcd at 4182-87.

earth stations of non-GSO MSS (space-to-Earth) systems and FS stations;[102] restoring exemptions from coordination from Article 11;[103] expanding the technical information requirements provided in Appendix 3 to enable precise calculations of power flux density values;[104] and adding a provision to Section 2.8 to clarify risks of not responding within the six-month period to requests for coordination.[105] Additional proposals address assistance to be rendered by the Bureau and editorial changes updating references to the ITU-R's structure.[106] As we discuss below, we further propose to modify Resolution 46 to make it applicable to NGSO MSS feeder link stations. Finally, our proposals do not include the addition of an affected region approach for coordination of MSS networks with co-frequency terrestrial and mobile earth stations.[107] Such methods are properly the subject of agreement between administrations where coordination is necessary and, therefore, need not be included in treaty text.[108]

B. MSS Feeder Links

59. In Second Notice, we described regulatory challenges facing NGSO MSS feeder links operating in the bands allocated to FSS.[109] Specifically, we noted the existence of a certain operational constraint, RR 2613, that seeks to prohibit NGSO emissions from causing unacceptable

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[102] Appendix 1, Section D, USA/ /26. See CPM Report at 93; IAC Final Report at 28, 154-55.

[103] Appendix 1, Section D, USA/ /27; See CPM Report at 105-06, 166.

[104] Appendix 1, Section D, USA/ /14. See CPM Report at 90-91; IAC Final Report at 155; E-SAT comments at 2; LEO One comments at 13; LQP comments at 20-21; ORBCOMM comments at 9; Iridium reply comments at 20; Motorola reply comments at 16.

[105] CPM Report at 90; IAC Interim Report at 69; Iridium comments at 21; Motorola comments at 10-11; Iridium reply comments at 21; Motorola reply comments at 16-17; see also ORBCOMM comments at 9.

[106] See, e.g., Appendix 1, Section D, USA/ / 13, USA/ /15.

[107] See CPM Report at 89-90; IAC Final Report at 28, 154; Iridium comments at 19-21; Iridium reply comments at 18-20; LQP comments at 19; Motorola reply comments at 15-16; TRW reply comments at 12-14.

[108] In its Final Report, the IAC supports the preservation of the status of certain systems in the 1525-1559/1626.5-1660.5 MHz bands, namely AMSC and INMARSAT, which were exempted from Resolution 46 at WARC-92 by operation of a joint U.S.-U.K. reservation, Final Protocol No. 679, to the WARC-92 Final Acts. IAC Final Report at 155-56; Second Notice, 10 FCC Rcd at 4185-86, n.56. We will prepare a position for use at WRC-95 to preserve status of systems in these bands that were already in coordination prior to adoption of Resolution 46 from that procedures provision in accordance the WARC-92 reservation.

[109] Second Notice, 10 FCC Rcd at 4187-91.

interference to current or future GSO FSS systems in bands to which this provision is applied.[110] The Radiocommunication Bureau does not currently apply RR 2613 but the constraint may be implemented by individual administrations. The existence of RR 2613 causes a tenuous regulatory status for NGSO MSS feeder links. Further exacerbating the confusion is that the Radio Regulations, including Resolution 46, do not specify coordination procedures for NGSO networks. The CPM observed that NGSO MSS network feeder links and GSO FSS networks "must have a regulatory base which permits their orderly operation without any regulatory uncertainties to their full operational life."[111]

60. The IAC studied RR 2613 and the uncertain regulatory environment in effect for NGSO systems. In its Final Report, the IAC submits proposals pertaining to the applicability of RR 2613 to specific frequency bands but was unable to come to consensus on a specific modification to the provision.[112] These proposals as they relate to specific frequency bands are generally reflected in our attached recommended proposals to amend Article 8 of the existing Radio Regulations, containing the Table of Frequency Allocations. See Appendix 1, Section C, USA/ /1 - USA/ / 31.[113]

61. IWG-1 identified two basic options to modify the applicability of RR 2613: 1) to limit its applicability to the currently heavily-used FSS bands; or 2) to waive its provisions in bands

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[110] RR 2613 provides:

> Non-geostationary space stations shall cease or reduce to a negligible level their emissions, and their associated earth stations shall not transmit to them, whenever there is insufficient angular separation between non-geostationary satellites and geostationary satellites resulting in unacceptable interference[1] to geostationary-satellite space systems in the fixed-satellite service operating in accordance with these regulations.
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> [1] The level of accepted interference shall be fixed by agreement between the administrations concerned, using the relevant CCIR Recommendations as a guide.

[111] CPM Report at 95.

[112] The IAC was unable to agree on the regulatory treatment of 17.7-20.2 GHz and 27.5-30.0 GHz. The GSO FSS proponents advocate continuing application of RR 2613 to these bands in order to preserve opportunities for future expansion of GSO FSS systems. IAC Final Report at 38-39. Proponents of NGSO MSS networks and NGSO FSS systems that would use the bands for FSS service links and feeder links argue that RR 2613 should not be applied in the above frequency bands so as not to unreasonably constrain growth of NGSO services. Id. at 37-38.

[113] Our proposals refer to RR 2613 in VGE parlance as S22.2.

(or specific sub-bands) designated for NGSO MSS feeder link use.[114] We have chosen the second option as the more direct and least difficult of the two approaches.[115] Our proposals to modify Article 8 seek to designate use of selected frequency bands for NGSO MSS feeder links on either a co-directional or bi-directional basis. They include footnotes specifying that the provisions of RR 2613 do not apply in the associated frequency bands but only for NGSO MSS feeder links operating in a specific direction of transmission.[116] The candidate bands we propose for NGSO MSS feeder links, in specific directions of transmission, are not currently heavily used by the FSS. Consequently, the FSS frequency bands that are currently heavily used by GSO FSS systems will continue to enjoy such protections that RR 2613 may provide them from NGSO systems in the same bands and/or in the direction of transmission not specifically allocated for NGSO MSS feeder link use by the footnotes to the Table.[117] We find that this proposed regulatory approach adequately addresses the status of NGSO MSS feeder links and GSO FSS networks without resorting to modifying the language of RR 2613.[118] Accordingly, we propose no change to RR 2613 itself at this time.[119]

62. The CPM expressed the view that coordination pursuant to Resolution 46 should be extended to feeder links in bands identified by WRC-95 for feeder links to NGSO MSS space stations.[120] It also offered suggestions that would reduce the amount of such coordination vis-a-vis the fixed service where conditions that it identified are met. Finally, CPM-95 offered examples of regulatory text. We generally agree with the CPM's recommendations. We conclude that NGSO MSS feeder links in bands designated by this conference should be implemented in accordance with the coordination and notification procedures set forth in Resolution 46 as modified at WRC-95. We offer a modified Resolution 46 (MOD Res 46) to accomplish these aims and to effect certain other improvements.

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[114] Comments on this matter were widely divergent and reflected the service provided by the commenter. NGSO MSS proponents tend to favor waiving RR 2613 in certain bands to be designated for use for NGSO MSS feeder links -- including in bands above 17.7 GHz. See, e.g., Iridium comments at 22-23; LQP comments at 28; Constellation reply comments at 5, 6. GSO FSS proponents are of the view that RR 2613 should not be relaxed in these bands. See, e.g., GE comments at 2-3,5, Hughes comments at 5-6.

[115] IAC Final Report at 33-39.

[116] Where RR 2613 does not apply, the coordination procedures of MOD Resolution 46 will apply.

[117] IAC Final Report at 34.

[118] Our experience at the WPCPM and CPM demonstrates that a more detailed consideration of RR 2613 at WRC-95 would prove to be a controversial and time-consuming effort which, because the provision is not applied by the Bureau, offers little or no cognizable benefit to U.S. interests.

[119] Accord TRW reply comments at 7-8. We note that the CPM Report did not address any specific revisions to RR 2613. We conclude that the provision requires further discussion in the U.S. and in the WPCPM before significant changes can be proposed. It is our view that RR 2613 should be reexamined in light of its current application and the need to have regulatory provisions that are clear and flexible to accommodate future implementation of various satellite configurations.

[120] CPM Report at 94-100.